

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1 1. (Currently amended): A method of controlling a storage device
2 controlling apparatus which includes:
3 a plurality of channel controllers having a circuit board on which are formed a file
4 access processing section receiving requests to input and output data in files as units from an
5 information processing apparatus via a network and an I/O processor outputting I/O requests
6 corresponding to said requests to input and output data to a storage device, said file access
7 processing section further translating data associated with a received file access request to
8 produce converted data which can be processed by said I/O processor and sending said converted
9 data to said I/O processor~~a corresponding block access request~~; and
10 a disk controller executing input and output of data into and from said storage
11 device in response to the I/O requests sent from said I/O processors, and
12 which manages a memory area provided by said storage device in logical
13 volumes, which are memory areas logically set on the memory area, said method comprising the
14 step of:
15 performing, by said disk controller, a replication management processing whereby
16 data is also written into a second logical volume to store a copy of the data in the second logical
17 volume, when said data is written into a first logical volume,
18 wherein at least one of the channel controllers or the disk controller is configured
19 to selectively perform:
20 copying data from a source logical unit (LU) to a destination LU on an LU
21 basis; and
22 copying data from the source LU to the destination LU on a file basis,

23 wherein copying on an LU basis includes copying data from the source
24 LU to the destination LU based on difference data indicative of differences between data
25 stored on the source LU and data stored on the destination LU,
26 wherein copying on a file basis includes copying a subject file and
27 metadata associated with the subject file to the destination LU.

1 2. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 1 further comprising the steps of:
3 receiving, by each of at least one of said channel controllers, information
4 specifying said to-be-copied data in files or directories as units, said information being sent from
5 said information processing apparatus; and
6 identifying, by each said at least one channel controller, data of a file or directory
7 specified by said information received and controlling such that the data is stored in said first
8 logical volume.

1 3. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 1 further comprising the steps of:
3 receiving, by each of at least one of said channel controllers, first information
4 specifying said to-be-copied data in files or directories as units, said first information being sent
5 from said information processing apparatus;
6 identifying, by each said at least one channel controller, data of a file or directory
7 specified by said first information received and controlling such that the data is stored in said
8 first logical volume;
9 receiving, by each said at least one channel controller, second information
10 instructing to stop said replication management processing, said second information being sent
11 from said information processing apparatus;
12 notifying, by each said at least one channel controller, said disk controller of an
13 effect when said second information is received;
14 stopping by said disk controller, when receiving said notifying, said replication
15 management process; and

16 starting to write into a plurality of first logical volumes after said replication
17 management processing stops if writing into said storage device data of a file or directory
18 specified by said first information causes writing into the plurality of first logical volumes, when
19 said second information is received.

1 4. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 1, wherein the channel controllers include at least one enabled to
3 communicate with the information processing apparatus through a LAN and at least one enabled
4 to communicate with the information processing apparatus through a Fibre Channel.

1 5. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 4, wherein each of the channel controllers enabled to communicate with the
3 information processing apparatus through a LAN is provided with its individual network address.

1 6. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 4, wherein each of the channel controllers enabled to communicate with the
3 information processing apparatus through a LAN includes a NAS manager providing a setting
4 Web page for setting the replication managing function.

1 7. (Currently amended): A method of controlling a storage device
2 controlling apparatus which includes:
3 a plurality of channel controllers having a circuit board on which are formed a file
4 access processing section receiving requests to input and output data in files as units from an
5 information processing apparatus via a network and an I/O processor outputting I/O requests
6 corresponding to said requests to input and output data to a storage device, said file access
7 processing section further translating data associated with a received file access request to
8 produce converted data which can be processed by said I/O processor and sending said converted
9 data to said I/O processor ~~a corresponding block access request~~; and
10 a disk controller executing input and output of data into and from said storage
11 device in response to the I/O requests sent from said I/O processors, and

12 which manages a memory area provided by said storage device in logical
13 volumes, which are memory areas logically set on the memory area, said method comprising the
14 step of:

15 performing, by said disk controller, a processing whereby data is sent to another
16 storage device controlling apparatus to store a copy of the data also in a second logical volume
17 provided by said another storage device controlling apparatus, when said data is written into a
18 first logical volume,

19 wherein at least one of the channel controllers or the disk controller is configured
20 to selectively perform:

21 copying data from a source logical unit (LU) to a destination LU on an LU
22 basis; and

23 copying data from the source LU to the destination LU on a file basis,
24 wherein copying on an LU basis includes copying data from the source
25 LU to the destination LU based on difference data indicative of differences between data
26 stored on the source LU and data stored on the destination LU,

27 wherein copying on a file basis includes copying a subject file and metadata
28 associated with the subject file to the destination LU.

1 8. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 7 further comprising the steps of:

3 receiving, by each of at least one of said channel controllers, information
4 specifying said to-be-copied data in files or directories as units, said information being sent from
5 said information processing apparatus; and

6 identifying, by each said at least one channel controller, data of a file or directory
7 specified by said first information received and controlling such that the data is stored in said
8 first logical volume.

1 9. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 7, wherein the channel controllers include at least one enabled to
3 communicate with the information processing apparatus through a LAN and at least one enabled
4 to communicate with the information processing apparatus through a Fibre Channel.

1 10. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 9, wherein each of the channel controllers enabled to communicate with the
3 information processing apparatus through a LAN is provided with its individual network address.

1 11. (Currently amended): A storage device controlling apparatus which
2 includes:

3 a plurality of channel controllers having a circuit board on which are formed a file
4 access processing section receiving requests to input and output data in files as units from an
5 information processing apparatus via a network and an I/O processor outputting I/O requests
6 corresponding to said requests to input and output data to a storage device, said file access
7 processing section further translating data associated with a received file access request to
8 produce converted data which can be processed by said I/O processor and sending said converted
9 data to said I/O processor~~a corresponding block access request~~; and

10 a disk controller executing input and output of data into and from said storage
11 device in response to the I/O requests sent from said I/O processors, and

12 which manages a memory area provided by said storage device in logical
13 volumes, which are memory areas logically set on the memory area,

14 said disk controller comprises a section which performs a replication management
15 processing whereby data is also written into a second logical volume to store a copy of the data
16 in the second logical volume, when said data is written into a first logical volume,

17 wherein at least one of the channel controllers or the disk controller is configured
18 to selectively perform:

19 copying data from a source logical unit (LU) to a destination LU on an LU

20 basis; and

21 copying data from the source LU to the destination LU on a file basis,
22 wherein copying on an LU basis includes copying data from the source
23 LU to the destination LU based on difference data indicative of differences between data
24 stored on the source LU and data stored on the destination LU,
25 wherein copying on a file basis includes copying a subject file and metadata
26 associated with the subject file to the destination LU.

1 12. (Original): A storage device controlling apparatus according to claim 11,
2 wherein each of at least one of said channel controllers comprises a section which receives
3 information specifying said to-be-copied data in files or directories as units, said information
4 being sent from said information processing apparatus; and
5 wherein each said at least one channel controller further comprises a section
6 which receives said information, identifies data of a file or directory specified by said
7 information, and controls such that the data is stored in said first logical volume.

1 13. (Original): A storage device controlling apparatus according to claim 11,
2 wherein each of at least one of said channel controllers comprises a section which receives first
3 information specifying said to-be-copied data in files or directories as units, said first information
4 being sent from said information processing apparatus; a section which identifies data of a file or
5 directory specified by said first information received and controls such that the data is stored in
6 said first logical volume; a section which receives second information instructing to stop said
7 replication management processing, said second information being sent from said information
8 processing apparatus; and a section which notifies said disk controller of an effect when said
9 second information is received;

10 wherein said disk controller further comprises a section which stops said
11 replication management processing when said notice is received; and

12 wherein each said at least one channel controller further comprises a section
13 which starts to write into a plurality of first logical volumes after said replication management
14 processing stops if writing into said storage device data of a file or directory specified by said

15 first information causes writing into the plurality of first logical volumes, when said second
16 information is received.

1 14. (Original): A storage device controlling apparatus according to claim 11,
2 wherein the channel controllers include at least one enabled to communicate with the
3 information processing apparatus through a LAN and at least one enabled to communicate with
4 the information processing apparatus through a Fibre Channel.

1 15. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 14, wherein each of the channel controllers enabled to communicate with the
3 information processing apparatus through a LAN is provided with its individual network address.

1 16. (Original): A storage device controlling apparatus according to claim 14,
2 wherein each of the channel controllers enabled to communicate with the information processing
3 apparatus through a LAN includes a NAS manager providing a setting Web page for setting the
4 replication managing function.

1 17. (Currently amended): A storage device controlling apparatus which
2 includes:

3 a plurality of channel controllers having a circuit board on which are formed a file
4 access processing section receiving requests to input and output data in files as units from an
5 information processing apparatus via a network and an I/O processor outputting I/O requests
6 corresponding to said requests to input and output data to a storage device, said file access
7 processing section further translating data associated with a received file access request to
8 produce converted data which can be processed by said I/O processor and sending said converted
9 data to said I/O processor ~~a corresponding block access request; and~~

10 a disk controller executing input and output of data into and from said storage
11 device in response to the I/O requests sent from said I/O processors, and

12 which manages a memory area provided by said storage device in logical
13 volumes, which are memory areas logically set on the memory area,

14 said disk controller comprises a section which performs a processing whereby
15 data is sent to another storage device controlling apparatus to store a copy of the data also in a
16 second logical volume provided by said another storage device controlling apparatus, when said
17 data is written into a first logical volume,
18 wherein at least one of the channel controllers or the disk controller is configured
19 to selectively perform:
20 copying data from a source logical unit (LU) to a destination LU on an LU
21 basis; and
22 copying data from the source LU to the destination LU on a file basis,
23 wherein copying on an LU basis includes copying data from the source
24 LU to the destination LU based on difference data indicative of differences between data
25 stored on the source LU and data stored on the destination LU,
26 wherein copying on a file basis includes copying a subject file and metadata
27 associated with the subject file to the destination LU.

1 18. (Original): A storage device controlling apparatus according to claim 17
2 wherein each of at least one of said channel controllers comprises a section which receives
3 information specifying said to-be-copied data in files or directories as units, said information
4 being sent from said information processing apparatus; and a section which identifies data of a
5 file or directory specified by said information received and controls such that the data is stored in
6 said first logical volume.

1 19. (Original): A storage device controlling apparatus according to claim 17,
2 wherein the channel controllers include at least one enabled to communicate with the
3 information processing apparatus through a LAN and at least one enabled to communicate with
4 the information processing apparatus through a Fibre Channel.

1 20. (Original): A method of controlling a storage device controlling apparatus
2 according to claim 19, wherein each of the channel controllers enabled to communicate with the
3 information processing apparatus through a LAN is provided with its individual network address.